

What is claimed is:

1. A method of communicating between a transmitter and a receiver in a wireless multicarrier system comprising the steps of:

5 setting in the transmitter an initial number of carriers and an initial symbol rate at which symbols are transmitted from the transmitter to the receiver;

transmitting a first group of symbols using the initial number of carriers and the initial symbol rate;

changing in the transmitter the rate at which symbols are transmitted from the transmitter to the receiver from the initial symbol rate to a subsequent symbol rate that is different than the initial symbol rate; and

10 transmitting a second group of symbols using the initial number of carriers and the subsequent symbol rate.

15 2. The method according to claim 1 wherein the step of changing the rate at which symbols are transmitted includes the step of changing a frequency output by a frequency synthesizer that is used to clock a serial to parallel converter, a divide by N counter coupled to an iFFT, and a parallel to serial converter.

3. The method according to claim 2 wherein the step of changing a frequency output by a frequency synthesizer uses a phase locked loop.

20 4. The method according to claim 1 wherein the step of changing the rate at which symbols are transmitted includes the step of changing a frequency that is used to clock a serial to parallel converter, a divide by N counter coupled to an iFFT, and a parallel to serial converter by changing a multiplexer output, thereby selecting a different circuit capable of generating the subsequent symbol rate rather than a previous circuit capable of generating the initial symbol rate.

25 5. The method according to claim 4 wherein the step of changing the multiplexer output selects between the different circuit and the previous circuit such that the different circuit and the previous circuit respectively provide a subsequent symbol clock rate and an initial symbol clock rate using at least one of a multiplier and divider.

6. A method of communicating between a transmitter and a receiver in a wireless multicarrier system comprising the steps of:

30 setting in the transmitter an initial number of carriers and an initial symbol rate at which symbols are transmitted from the transmitter to the receiver;

transmitting a first group of symbols using the initial number of carriers and the initial symbol rate;

changing in the transmitter the number of carriers in active use from the initial number of carriers to a subsequent number of carriers that is different than the initial number of carriers; and

5 transmitting a second group of symbols using the subsequent number of carriers.

7. The method according to claim 6 wherein the step of transmitting the second group of symbols transmits at the initial symbol rate.

8. The method according to claim 6 wherein the step of changing in the transmitter the number of carriers in active use includes the step of informing the transmitter of those carriers that were used in the initial number of carriers and will not be used in the subsequent number of carriers by placing zero
10 magnitude signals on those carriers within the transmitter.

9. The method according to claim 6 wherein the step of changing in the transmitter the number of carriers in active use includes the step of informing the transmitter of those carriers that were not used in the initial number of carriers and will be used in the subsequent number of carriers by placing data
15 conveying signals into those carriers that previously had zero magnitude signals within the transmitter

10. The method according to claim 6 wherein the step of changing in the transmitter the number of carriers in active use includes the steps of:

changing an iFFT size of an iFFT in the transmitter; and

changing a serializer control signal to change inputs of a parallel to serial converter that is
20 coupled to the iFFT in the transmitter.

11. The method according to claim 6 wherein the step of changing in the transmitter the number of carriers in active use includes the step of changing an iFFT size of an iFFT in the transmitter by a factor that is a power of two.

12. The method according to claim 11 wherein the step of changing in the transmitter the number of
25 carriers in active use further includes the step of informing the transmitter of those carriers that were used in the initial number of carriers and will not be used in the subsequent number of carriers by placing zero magnitude signals on those carriers within the transmitter.

13. The method according to claim 11 wherein the step of changing in the transmitter the number of
30 carriers in active use further includes the step of informing the transmitter of those carriers that were not used in the initial number of carriers and will be used in the subsequent number of carriers by placing data conveying signals into those carriers that previously had zero magnitude signals within the transmitter.

14. A method of communicating between a transmitter and a receiver in a wireless multicarrier system comprising the steps of:

setting in the transmitter an initial number of carriers and an initial symbol rate at which symbols are transmitted from the transmitter to the receiver;

5 transmitting a first group of symbols using the initial number of carriers and the initial symbol rate;

changing in the transmitter the rate at which symbols are transmitted from the transmitter to the receiver from the initial symbol rate to a subsequent symbol rate that is different than the initial symbol rate;

10 changing in the transmitter the number of carriers in active use from the initial number of carriers to a subsequent number of carriers that is different than the initial number of carriers; and

transmitting a second group of symbols using the subsequent number of carriers and the subsequent symbol rate.

15 15. The method according to claim 14 wherein the step of changing the rate at which symbols are transmitted includes the step of changing a frequency output by a frequency synthesizer that is used to clock a serial to parallel converter, a divide by N counter coupled to an iFFT, and a parallel to serial converter.

16. The method according to claim 15 wherein the step of changing a frequency output by a frequency synthesizer uses a phase locked loop.

20 17. The method according to claim 14 wherein the step of changing the rate at which symbols are transmitted includes the step of changing a frequency that is used to clock a serial to parallel converter, a divide by N counter coupled to an iFFT, and a parallel to serial converter by changing a multiplexer output, thereby selecting a different circuit capable of generating the subsequent symbol rate rather than a previous circuit capable of generating the initial symbol rate.

18. The method according to claim 17 wherein the step of changing the multiplexer output selects between the different circuit and the previous circuit such that the different circuit and the previous circuit respectively provide a subsequent symbol clock rate and an initial symbol clock rate using at least one of a multiplier and divider.

30 19. The method according to claim 14 wherein the step of transmitting the second group of symbols transmits at the initial symbol rate.

20. The method according to claim 14 wherein the step of changing in the transmitter the number of carriers in active use includes the step of informing the transmitter of those carriers that were used in the initial number of carriers and will not be used in the subsequent number of carriers by placing zero magnitude signals on those carriers within the transmitter.

21. The method according to claim 14 wherein the step of changing in the transmitter the number of carriers in active use includes the step of informing the transmitter of those carriers that were not used in the initial number of carriers and will be used in the subsequent number of carriers by placing data conveying signals into those carriers that previously had zero magnitude signals within the transmitter

22. The method according to claim 14 wherein the step of changing in the transmitter the number of carriers in active use includes the steps of:

changing an iFFT size of an iFFT in the transmitter; and

changing a serializer control signal to change inputs of a parallel to serial converter that is coupled to the iFFT in the transmitter.

23. The method according to claim 14 wherein the step of changing in the transmitter the number of carriers in active use includes the step of changing an iFFT size of an iFFT in the transmitter by a factor that is a power of two.

24. The method according to claim 23 wherein the step of changing in the transmitter the number of carriers in active use further includes the step of informing the transmitter of those carriers that were used in the initial number of carriers and will not be used in the subsequent number of carriers by placing zero magnitude signals on those carriers within the transmitter.

25. The method according to claim 23 wherein the step of changing in the transmitter the number of carriers in active use further includes the step of informing the transmitter of those carriers that were not used in the initial number of carriers and will be used in the subsequent number of carriers by placing data conveying signals into those carriers that previously had zero magnitude signals within the transmitter.

26. A method of communicating between a transmitter and a receiver in a wireless multicarrier system comprising the steps of:

selecting in the transmitter , from among a predetermined plurality of carriers and a predetermined plurality of symbol rates, a particular number of carriers and a particular symbol rate at which symbols are transmitted from the transmitter to the receiver based upon prior knowledge of at least one predetermined channel characteristic; and

transmitting a group of symbols using the selected number of carriers and the selected symbol rate.

27. The method according to claim 26 wherein the step of selecting chooses the particular symbol rate at which symbols are transmitted and the particular number of carriers used based upon the at least one predetermined channel characteristic of channel quality.

28. The method according to claim 26 wherein the step of selecting chooses the particular symbol rate at which symbols are transmitted and the particular number of carriers used based upon the at least one predetermined channel characteristic of channel traffic.

29. The method according to claim 26 wherein the step of selecting chooses the particular symbol rate at which symbols are transmitted and the particular number of carriers used based upon the at least one predetermined channel characteristic of regulatory power limits.

30. The method according to claim 26 wherein the step of selecting chooses the particular symbol rate at which symbols are transmitted and the particular number of carriers used based upon the at least one predetermined channel characteristic of interference that exists on the predetermined plurality of carriers.

31. The method according to claim 30 wherein the interference exists as a result of other transmissions from other transmitters.

32. The method according to claim 26 wherein the step of selecting chooses the particular symbol rate at which symbols are transmitted and the particular number of carriers used based upon the at least one predetermined channel characteristic of available frequency.

33. A method of communicating between first and second transceivers in a wireless multicarrier system comprising the steps of:

selecting in the first transceiver a particular number of carriers s and a particular symbol rate at which symbols are transmitted from the first transceiver to the second transceiver from among a predetermined plurality of carriers and a predetermined plurality of symbol rates based upon prior knowledge of at least one predetermined channel characteristic obtained by analyzing a sounding signal; and

transmitting a group of symbols using the number of carriers, the initial carrier spacing, and the initial symbol rate.

34. The method according to claim 33 wherein the sounding signal analyzed in the step of selecting includes known data in a header portion.

35. The method according to claim 34 wherein the sounding signal analyzed in the step of selecting is a normal data transmission.

36. The method according to claim 33 wherein the step of selecting transmits the sounding signal from the first transceiver to the second transceiver.

5 37. The method according to claim 36 wherein the step of transmitting transmits the group of symbols from the first transceiver to the second transceiver.

38. The method according to claim 36 wherein the sounding signal analyzed in the step of selecting includes known data in a header portion.

10 39. The method according to claim 38 wherein the sounding signal analyzed in the step of selecting is a normal data transmission.

40. The method according to claim 33 wherein the step of selecting transmits the sounding signal from the second transceiver to the first transceiver.

41. The method according to claim 40 wherein the step of transmitting transmits the group of symbols from the first transceiver to the second transceiver.

15 42. The method according to claim 40 wherein the sounding signal analyzed in the step of selecting includes known data in a header portion.

43. The method according to claim 40 wherein the sounding signal analyzed in the step of selecting is a normal data transmission.

20 44. The method according to claim 33 wherein the step of setting analyzes the sounding signal to determine whether another transmitter is interfering with the transmitter.

45. The method according to claim 33 wherein the step of setting analyzes the sounding signal that spans a maximum bandwidth available between the transmitter and the receiver.

46. The method according to claim 33 wherein the step of setting analyzes the sounding signal that spans less than a maximum bandwidth available between the transmitter and the receiver.

25 47. The method according to claim 33 wherein the step of setting analyzes the sounding signal at one data rate and a plurality of other sounding signals, each at consecutively higher data rates, until communications fail.

30 48. The method according to claim 33 wherein the step of setting analyzes the sounding signal at one data rate and a plurality of other sounding signals, each at consecutively lower data rates, until communication is established.

49. The method according to claim 47 further including the step of storing information related to whether communications succeeded with respect to the sounding signal and the plurality of other sounding signals.

50. The method according to claim 48 further including the step of storing information related to whether communications succeeded with respect to the sounding signal and the plurality of other sounding signals.

51. A method of communicating between a transmitter and a receiver on a channel in a wireless multicarrier system comprising the steps of:

selecting in the transmitter a particular number of carriers and a particular symbol rate at which symbols are transmitted from the transmitter to the receiver from among a predetermined plurality of carriers and a predetermined plurality of symbol rates based upon interfering signals determined as being present in the channel by listening to the channel for a period of time, and

transmitting a group of symbols using the particular number of carriers and the particular symbol rate.

52. A method of communicating between at least a first transceiver and second transceiver in a wireless multicarrier system comprising the steps of:

selecting at least one of a particular number of carriers and a particular symbol rate at which symbols are transmitted from the first transceiver to the second transceiver from among a predetermined plurality of carriers and a predetermined plurality of symbol rates on a packet to packet basis, and

transmitting from the first transceiver to the second transceiver a group of symbols within each packet using the at least one of particular number of carriers and the particular symbol rate.

53. The method according to claim 52 wherein both the particular number of carriers and the particular symbol rate at which symbols are transmitted are selected during the step of selecting.

54. The method according to claim 52 wherein the particular number of carriers is selected during the step of selecting.

55. The method according to claim 52 wherein the particular symbol rate at which symbols are transmitted is selected during the step of selecting.

56. The method according to claim 52 wherein the step of selecting takes place within the first transceiver.

57. The method according to claim 56 wherein the wireless multicarrier system includes at least a third transceiver, and further including the steps of:

selecting at least one of a second particular number of carriers and a second particular symbol rate at which symbols are transmitted from the first transceiver to the third transceiver from among the predetermined plurality of carriers and the predetermined plurality of symbol rates on the packet to packet basis, and

transmitting from the first transceiver to the third transceiver another group of symbols within each packet using the at least one of second particular number of carriers and the second particular symbol rate.

58. The method according to claim 57 wherein both the second particular number of carriers and the second particular symbol rate at which symbols are transmitted are selected during the step of selecting.

59. The method according to claim 57 wherein the second particular number of carriers is selected during the step of selecting.

60. The method according to claim 57 wherein the second particular symbol rate at which symbols are transmitted is selected during the step of selecting.

61. The method according to claim 57 wherein the step of selecting at least one of the second particular number of carriers and the second particular symbol rate takes place within the first transceiver.

62. The method according to claim 52 wherein the wireless multicarrier system includes at least a third transceiver, and further including the steps of:

selecting at least one of a second particular number of carriers and a second particular symbol rate at which symbols are transmitted from the first transceiver to the third transceiver from among the predetermined plurality of carriers and the predetermined plurality of symbol rates on the packet to packet basis, and

transmitting from the first transceiver to the third transceiver another group of symbols within each packet using the at least one of second particular number of carriers and the second particular symbol rate.

63. The method according to claim 62 wherein both the second particular number of carriers and the second particular symbol rate at which symbols are transmitted are selected during the step of selecting.

64. The method according to claim 62 wherein the second particular number of carriers is selected during the step of selecting.

65. The method according to claim 62 wherein the second particular symbol rate at which symbols are transmitted is selected during the step of selecting.

66. The method according to claim 62 wherein the step of selecting at least one of the second particular number of carriers and the second particular symbol rate takes place within the first transceiver.

5 67. The method according to claim 52 wherein the step of transmitting transmits each packet with information contained in a header therein indicating the at least one of particular number of carriers and the particular symbol rate.

68. The method according to claim 52 wherein the step of transmitting transmits each packet with information contained in a header therein indicating both the particular number of carriers and the
10 particular symbol rate.

69. The method according to claim 52 wherein the step of transmitting transmits each packet with information contained in a header therein indicating the particular number of carriers.

70. The method according to claim 52 wherein the step of transmitting transmits each packet with information contained in a header therein indicating the particular symbol rate.

15 71. The method according to claim 52 wherein the step of selecting takes into consideration at least one of a legacy number of carriers and legacy symbol rates which the second transceiver can receive when selecting the at least one of particular number of carriers and the particular symbol rate, such that only legacy carriers and legacy symbol rates are selected.

72. A method of communicating from a first transceiver in a wireless multicarrier system comprising
20 the steps of:

selecting at least one of a particular number of carriers and a particular symbol rate at which symbols are transmitted from the first transceiver from among a predetermined plurality of carriers and a predetermined plurality of symbol rates;

25 transmitting from the first transceiver a group of symbols using the at least one of particular number of carriers and the particular symbol rate;

further selecting at least one of a second particular number of carriers and a second particular symbol rate at which symbols are transmitted from the first transceiver based upon at least one of a legacy number of carriers that are less than the predetermined plurality of carriers and legacy symbol rates that are less than the predetermined plurality of symbol rates; and

transmitting from the first transceiver the another group of symbols using the at least one of second particular number of carriers and the second particular symbol rate during the subsequent period of time.

73. The method according to claim 72 wherein:

both the particular number of carriers and the particular symbol rate at which symbols are transmitted are selected during the step of selecting; and

both the second particular number of carriers and the second particular symbol rate at which symbols are transmitted are selected during the step of further selecting.

74. The method according to claim 72 wherein:

the particular number of carriers is selected during the step of selecting; and

the second particular number of carriers is selected during the step of further selecting.

75. The method according to claim 72 wherein:

the particular symbol rate at which symbols are transmitted is selected during the step of selecting; and

the second particular symbol rate at which symbols are transmitted is selected during the step of further selecting.

76. A method of communicating from a first transceiver to a second transceiver in a wireless multicarrier system comprising the steps of:

selecting a particular number of carriers over which symbols can be transmitted from the first transceiver to the second transceiver from among a predetermined plurality of carriers, wherein the step of selecting includes the steps of:

determining a maximum number of carriers that channel conditions permit; and

determining that the maximum number of carriers is greater than a permitted number of carriers for the second transceiver; and

limiting the particular number of carriers to those carriers that are permitted, regardless of the determined maximum number of carriers that channel conditions permit.; and

transmitting from the first transceiver to the second transceiver a group of symbols using the particular number of carriers.

77. The method according to claim 76 wherein the step of selecting also selects a particular symbol rate at which symbols are transmitted from the first transceiver to the second transceiver from among a predetermined plurality of symbol rates, wherein the step of selecting further includes the steps of

determining a maximum symbol rate that channel conditions permit; and

5 determining that the maximum symbol rate is greater than a permitted symbol rate for the second transceiver; and

limiting the particular symbol rate to one of the permitted symbol rates, regardless of the determining maximum symbol rate that channel conditions permit.

78. A method of communicating from a first transceiver to a second transceiver in a wireless multicarrier system comprising the steps of:

selecting a particular symbol rate at which symbols are transmitted from the first transceiver to the second transceiver from among a predetermined plurality of symbol rates, wherein the step of selecting includes the steps of:

determining a maximum symbol rate that channel conditions permit; and

15 determining that the maximum symbol rate is greater than a permitted symbol rate for the second transceiver; and

limiting the particular symbol rate to one of the permitted symbol rates, regardless of the determining maximum symbol rate that channel conditions permit; and

20 transmitting from the first transceiver to the second transceiver a group of symbols using the particular symbol rate.

79. A method of communicating from a first transceiver in a wireless multicarrier system comprising the steps of:

transmitting from the first transceiver a group of symbols using a first particular number of carriers and a first particular symbol rate during a first period of time; and

25 transmitting from the first transceiver another group of symbols using a second particular number of carriers and a second particular symbol rate during a subsequent period of time, wherein at least one of the second particular number of carriers and the second particular symbol rate is different than the first particular number of carriers and the first particular symbol rate.

80. The method according to claim 79 wherein the second particular number of carriers and the second particular symbol rate are identified in a header portion of the group of symbols transmitted at the first particular number of carriers and the first particular symbol rate; and

further including the step configuring the first transceiver to transmit the another group of symbols using the second particular number of carriers and the second particular symbol rate identified in the header portion of the group of symbols transmitted at the first particular number of carriers and the first particular symbol rate.

81. The method according to claim 80 wherein:

both the second particular number of carriers and the second particular symbol rate are different than the first particular number of carriers and the first particular symbol rate.

82. The method according to claim 81 wherein the second particular number of carriers is greater than the first particular number of carriers and the second particular symbol rate is greater than the first particular symbol rate.

83. The method according to claim 79 wherein:

both the second particular number of carriers and the second particular symbol rate are different than the first particular number of carriers and the first particular symbol rate.

84. The method according to claim 83 wherein the second particular number of carriers is greater than the first particular number of carriers and the second particular symbol rate is greater than the first particular symbol rate.

85. The method according to claim 79 wherein the step of transmitting the group during the first period of time and transmitting the second group during the subsequent period of time are repeated in a cyclic manner.